

**Willow Creek Mill Site  
Facility ID # 522, Reckey # 97220021902; L55.326  
Fuel Contaminated Soil Stockpile Sampling  
and Closure Recommendation**

JUN 12 2006

**Summary:**

This report presents the results of sampling the contaminated stockpile located at the Alaska Hardrock Inc. (owner) facility at mile 23 Hatcher Pass Rd., designated the Willow Creek Mill Site by the Alaska Department of Environmental Conservation (ADEC). The stockpile apparently meets default cleanup limits.

Recommendations include requesting ADEC to grant closure of the stockpile and allow spreading on site, and NFRAP (or complete) closure for the site.

**Site Description, Background, and History:**

The site, Tract B of Plat 4944 in Section 2, T19N R1W, S.M., contains 29.24 acres located on the crest of a ridge overlooking Willow and Craigie Cr. (see Figure 1). The facility was built in 1982 as a mill site to support gold exploration and development activities nearby. The facility lies on the north side of the ridge, with surface drainage to the northwest towards Craigie Cr., ~1/2 mile away and ~250 ft below.

Five USTs were removed in 1997<sup>1</sup> and diesel and gasoline soil contamination was found in each of the three UST pits, which was not entirely excavated. Contaminated soil was placed in a lined stockpile<sup>2</sup>; features included a 20 mil bottom liner with 4 and 6 inch perforated aeration pipes. The stockpile contained approximately 500 yd<sup>3</sup>.

The contaminated soil had been moved several times since originally excavated, indicating a well mixed stockpile. Soil was silty gravel with moderately high organic content and boulders. The soil just above the liner was water saturated, which probably retarded degradation of the contaminants. The stockpile was later restacked with additional piping into two taller piles on the same liner. This opened up the interior of the stockpile near the liner.

The excavations had been left open to facilitate natural attenuation. In July of 2000, the excavations and stockpile were sampled according to the '98 Corrective Action Plan to assess attenuation progress<sup>3</sup>. Significant progress in attenuation was noted for the excavations; only one in-situ sample was above ADEC Method 2 default cleanup limits (826 mg/kg DRO), and that area could not safely be excavated due to building foundation stability. Two samples were also taken from the stockpile; only one tested slightly above default limits (299 mg/kg DRO).

<sup>1</sup> Shannon & Wilson; UST Closure Assessment; October 1997

<sup>2</sup> Thor Gold Alaska Inc.; Corrective Action Plan; December 1998

<sup>3</sup> Erdman & Associates; letter to Thor Gold Alaska; September 11, 2000

## Stockpile Sampling:

The stockpile was resampled on 9/22/04 during rainy weather. The stockpile included two piles on an intact 20 mil liner, with several aeration galleries (see Figure 1 and photos 1 and 2). The depth of the stockpile was ~ 6 ft. Total volume of the two piles was ~500 yd<sup>3</sup>. The liner sloped slightly towards the west, and water had accumulated to ~1.5 ft deep at the western dike. There was stormwater run-on from the east, but no run-off from the stockpile dike.

The intended purpose of this sampling was to demonstrate excavated soil had sufficiently remediated, according to 18 AAC 78.605(b), Table C; five soil samples are recommended.

The piles were divided into five areas of approximately equal volume. Screening used a 1.5 ft probe driven into the ground, withdrawn, then the tip of a MiniRAE 2000 photoionization detector (PID) inserted and reading noted. No elevated PID readings or odors were observed. Holes were dug ~1.5 ft into the stockpiles in areas believed likely to encounter contamination. Five samples were collected according to ADEC's UST Procedures Manual for diesel and gasoline contaminants, and delivered under chain of custody documentation to SGS laboratories.

## Sample Results:

Samples were analyzed on 9/30/04 for DRO by AK102 and GRO/BTEX by AK101/8021B with no reported anomalies. All samples were either non-detect or well below default cleanup limits. Table 1 lists the results and Appendix 1 includes the lab reports.

**Table 1 Laboratory Results Summary** (in mg/kg)

	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO
Method	AK101/8021B					AK102
<i>Goal, mg/kg</i>	<i>.02</i>	<i>5.5</i>	<i>5.4</i>	<i>78</i>	<i>300</i>	<i>250</i>
AG92204-1	U	U	U	U	U	97.6
AG92204-2	U	U	U	U	U	43.8
AG92204-3	U	U	U	U	U	U
AG92204-4	U	U	U	U	U	U
AG92204-5	U	U	U	U	U	68.3

U = non-detect

## Discussion and Recommendations:

The stockpile was sampled according to the applicable regulations and guidance, and found to meet default cleanup limits for all contaminants. Although higher concentration samples can reasonably be expected with greater sampling density, this stockpile presents low risk of significant undetected hotspots due to previous mixing and long aeration period. Consequently, I recommend spreading the stockpiled soil on site and recycling or disposing the liner.

The remainder of the site has not been investigated since July 2000 when Erdman & Associates sampled each of the originally identified hotspots in the open excavations. All hotspots were

reported to have significantly remediated, and only one was found to exceed default cleanup limits, for DRO, and that was below the shop foundation where no further excavation was practical. The excavations were then closed for safety and structural reasons. The intervening four years have served to further degrade any remaining petroleum concentrations.

Although the Erdman report is brief, the sampling was conducted by an experienced local engineer listed on the ADEC qualified persons database and therefore is presumed to have followed applicable guidance. Hence, the results are presumed valid for decisions, although the Department has apparently not yet commented on this report.

Given that only one spot remained above default limits four years ago, the site should meet ADEC guidelines for No Further Remedial Action Planned (NFRAP) status with the caveat that potentially contaminated soil not be removed from the site. Since excavating under the foundation and moving the soil off-site is such a remote possibility with minimal health or environmental effects, a simple site closure also appears appropriate.

In summary, I recommend that ADEC be requested to allow stockpile spreading on-site, and the site be granted simple closure or NFRAP status.

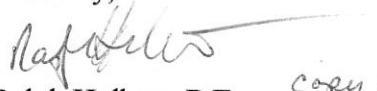
**Limitations:**

The findings and recommendations in this report are based on limited on-site investigation, sampling, interviews, and research. Additional investigation may reveal different conditions and alter the conclusions and recommendations.

This report was prepared for the exclusive use of the facility owner, Alaska Hardrock Inc. ADEC and other agencies may require reporting this information. I will not divulge the contents of this report without the owner's permission.

I appreciate the opportunity to be of service, and will be pleased to answer any questions regarding this report.

Sincerely,

  
Ralph Hulbert, P.E. *copy 1*

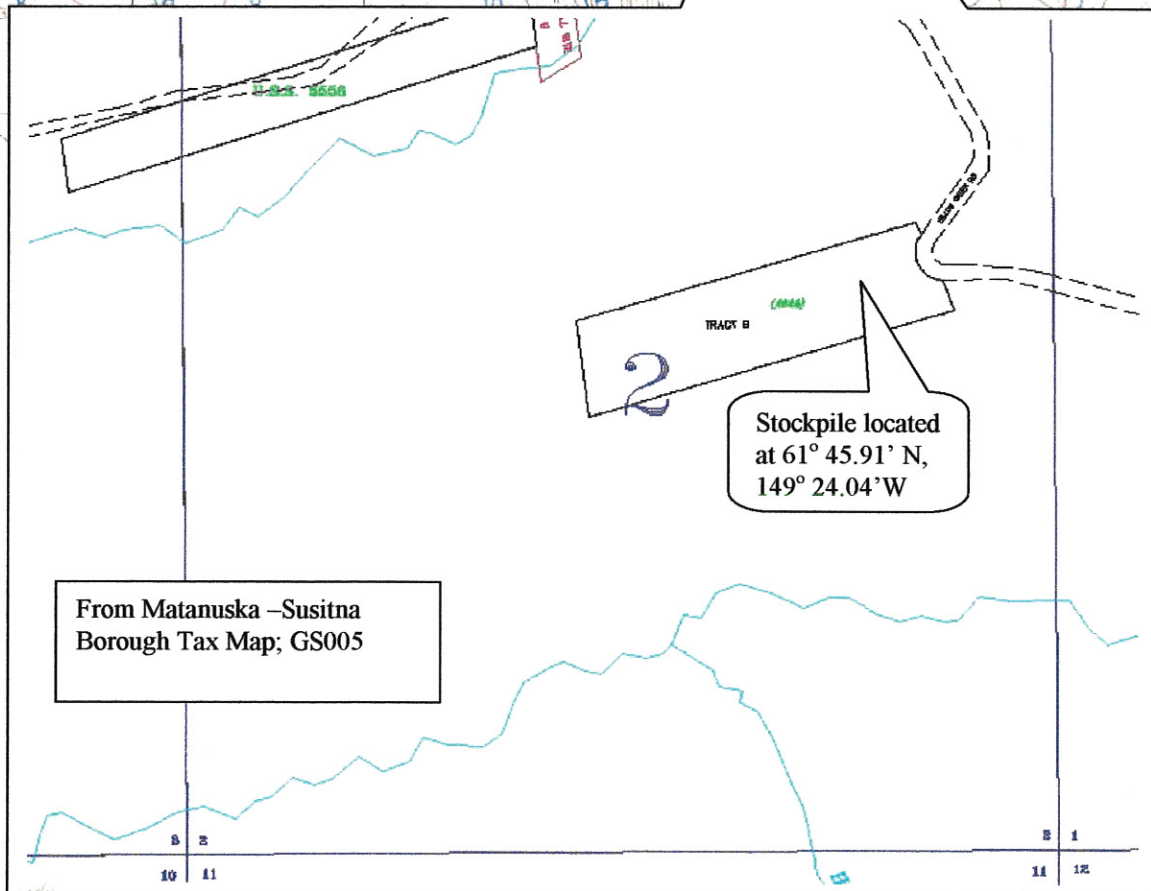
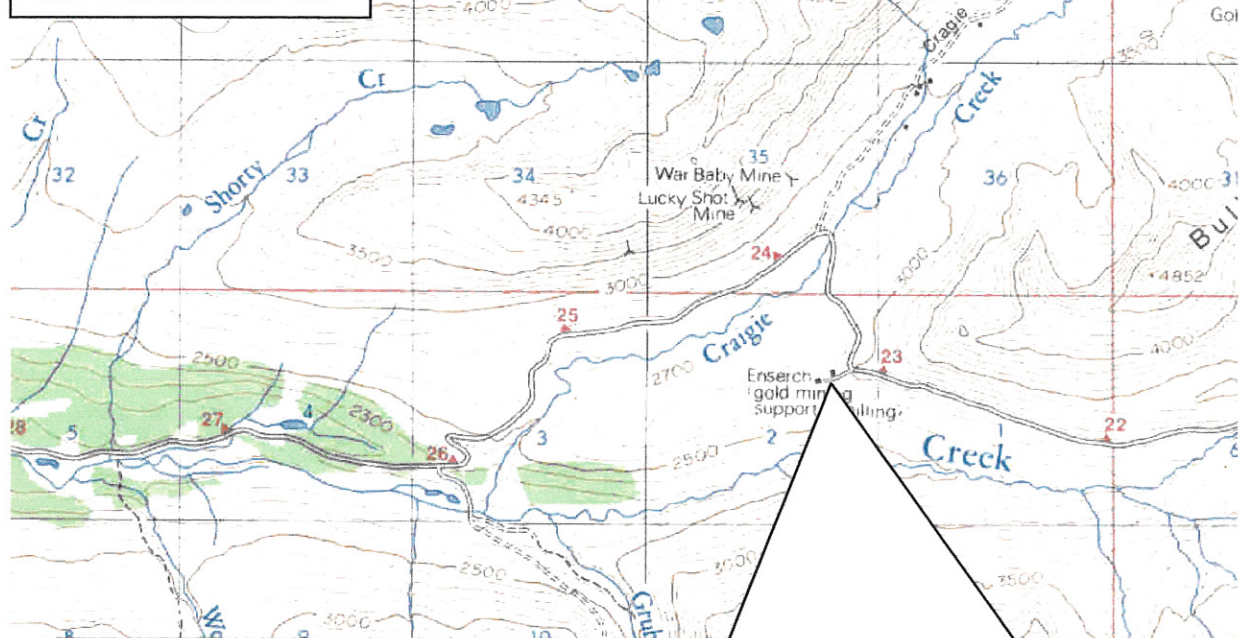
11/4/04  
Date

Att: Figure 1 Location  
Figure 2 Stockpile Sketch  
Appendix 1 Laboratory Analysis Report; WO 1046271  
Appendix 2 Photos



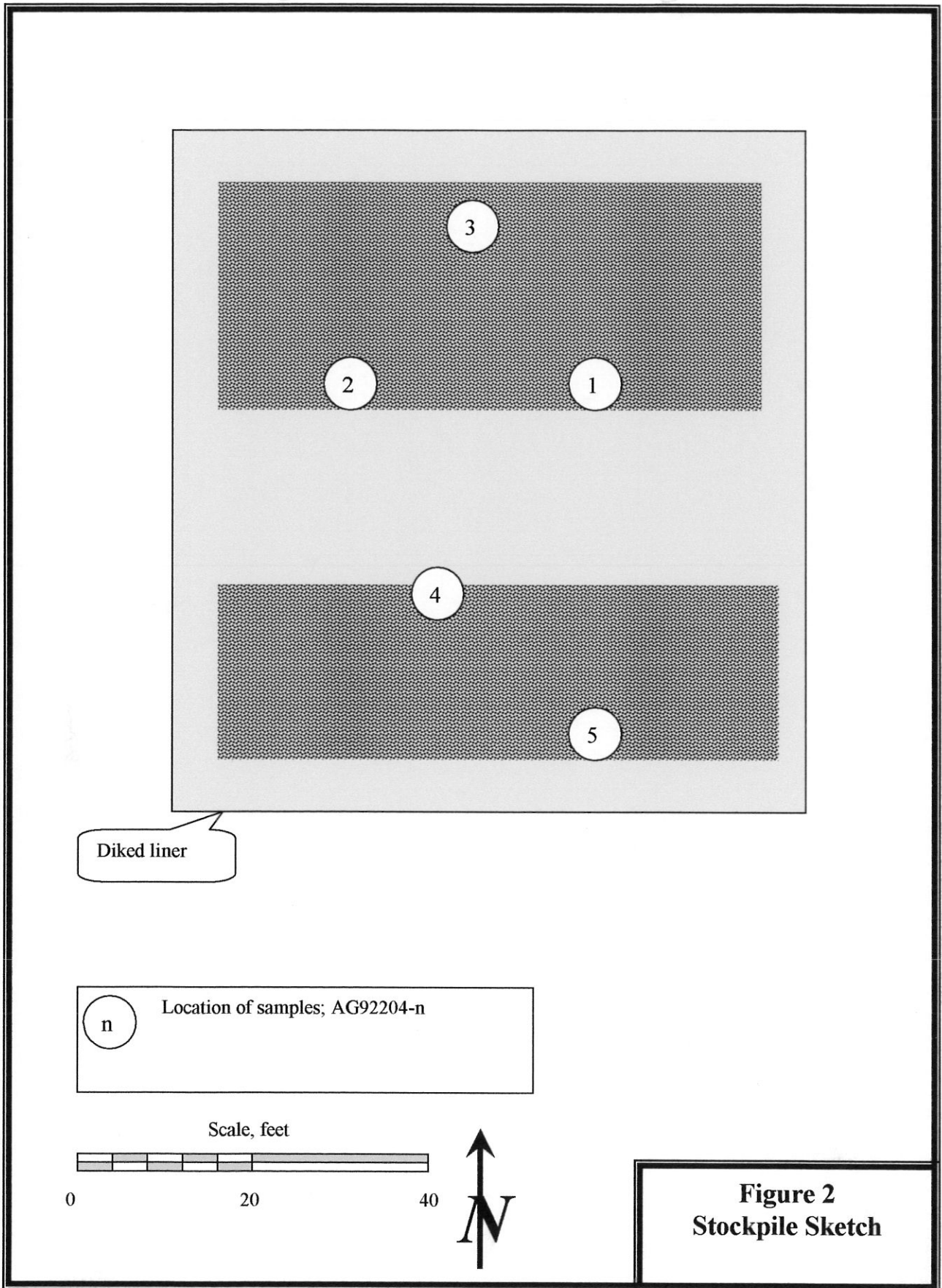
From Matanuska Valley  
Road and Recreation Map;  
Todd Communications 1997

**Figure 1 Location**



From Matanuska -Susitna  
Borough Tax Map; GS005

Stockpile located  
at 61° 45.91' N,  
149° 24.04' W



200 W. Potter Drive  
Anchorage, AK 99518-1605  
Tel: (907) 562-2343  
Fax: (907) 561-5301  
Web: <http://www.sgsenvironmental.com>

Reports To:  
Hulbert, Ralph P.E.  
P.O. Box 1846  
Palmer, AK 99645

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<b>Work Order:</b>	1046271
	AK Gold Stockpile
<b>Client:</b>	Hulbert, Ralph P.E.
<b>Report Date:</b>	October 04, 2004

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Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by SGS. A copy of our Quality Control Manual that outlines this program is available at your request. The laboratory ADEC certification numbers are AK08-03 (DW), UST-005 (CS) and AK00971 (Micro).

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS Quality Assurance Program Plan and the National Environmental Laboratory Accreditation Conference.

If you have any questions regarding this report or if we can be of any other assistance, please call your SGS Project Manager at (907) 562-2343.

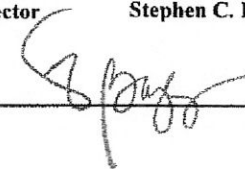
The following descriptors may be found on your report which will serve to further qualify the data.

PQL	Practical Quantitation Limit (reporting limit).
U	Indicates the analyte was analyzed for but not detected.
F	Indicates an estimated value that falls below PQL, but is greater than the MDL.
J	The quantitation is an estimation.
B	Indicates the analyte is found in a blank associated with the sample.
*	The analyte has exceeded allowable regulatory or control limits.
GT	Greater Than
D	The analyte concentration is the result of a dilution.
LT	Less Than
!	Surrogate out of control limits.
Q	QC parameter out of acceptance range.
M	A matrix effect was present.
JL	The analyte was positively identified, but the quantitation is a low estimation.
E	The analyte result is high outside of calibrated range.

Note: Soil samples are reported on a dry weight basis unless otherwise specified



SGS Ref.# 1046271001  
Client Name Hulbert, Ralph P.E.  
Project Name/# AK Gold Stockpile  
Client Sample ID AG92204-1  
Matrix Soil/Solid

All Dates/Times are Alaska Standard Time  
Printed Date/Time 10/04/2004 9:30  
Collected Date/Time 09/22/2004 15:30  
Received Date/Time 09/23/2004 10:23  
Technical Director Stephen C. Ede  
Released By 

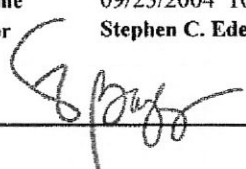
Sample Remarks:

DRO - The pattern is consistent with a weathered middle distillate.

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<b>Volatile Fuels Department</b>									
Gasoline Range Organics	2.23 U	2.23	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Benzene	0.0111 U	0.0111	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Toluene	0.0446 U	0.0446	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Ethylbenzene	0.0446 U	0.0446	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
P & M -Xylene	0.0446 U	0.0446	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
o-Xylene	0.0446 U	0.0446	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
<b>Surrogates</b>									
1,4-Difluorobenzene <surr>	83.9		%	AK101 8021B	A	72-105	09/22/04	09/30/04	MCM
4-Bromofluorobenzene <surr>	82.5		%	AK101 8021B	A	50-150	09/22/04	09/30/04	MCM
<b>Semivolatile Organic Fuels Department</b>									
Diesel Range Organics	97.6	30.9	mg/Kg	AK102	B		09/29/04	09/30/04	MCM
<b>Surrogates</b>									
5a Androstane <surr>	101		%	AK102	B	50-150	09/29/04	09/30/04	MCM
<b>Solids</b>									
Total Solids	87.6		%	SM20 2540G	B			09/28/04	AHP



SGS Ref.# 1046271002  
Client Name Hulbert, Ralph P.E.  
Project Name/# AK Gold Stockpile  
Client Sample ID AG92204-2  
Matrix Soil/Solid

All Dates/Times are Alaska Standard Time  
Printed Date/Time 10/04/2004 9:30  
Collected Date/Time 09/22/2004 15:30  
Received Date/Time 09/23/2004 10:23  
Technical Director Stephen C. Ede  
Released By 

Sample Remarks:

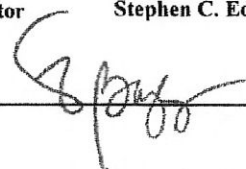
DRO - The pattern is consistent with a weathered middle distillate.

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<b>Volatile Fuels Department</b>									
Gasoline Range Organics	2.27 U	2.27	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Benzene	0.0114 U	0.0114	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Toluene	0.0454 U	0.0454	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Ethylbenzene	0.0454 U	0.0454	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
P & M -Xylene	0.0454 U	0.0454	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
o-Xylene	0.0454 U	0.0454	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
<b>Surrogates</b>									
1,4-Difluorobenzene <surr>	81.8		%	AK101 8021B	A	72-105	09/22/04	09/30/04	MCM
4-Bromofluorobenzene <surr>	70.6		%	AK101 8021B	A	50-150	09/22/04	09/30/04	MCM
<b>Semivolatile Organic Fuels Department</b>									
Diesel Range Organics	43.8	29.9	mg/Kg	AK102	B		09/29/04	09/30/04	MCM
<b>Surrogates</b>									
5a Androstane <surr>	134		%	AK102	B	50-150	09/29/04	09/30/04	MCM
<b>Solids</b>									
Total Solids	87.7		%	SM20 2540G	B			09/28/04	AHP





SGS Ref.# 1046271003  
Client Name Hulbert, Ralph P.E.  
Project Name/# AK Gold Stockpile  
Client Sample ID AG92204-3  
Matrix Soil/Solid

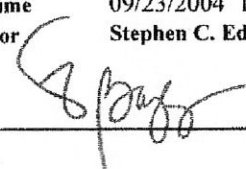
All Dates/Times are Alaska Standard Time  
Printed Date/Time 10/04/2004 9:30  
Collected Date/Time 09/22/2004 15:30  
Received Date/Time 09/23/2004 10:23  
Technical Director Stephen C. Ede  
Released By 

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<b>Volatile Fuels Department</b>									
Gasoline Range Organics	3.00 U	3.00	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Benzene	0.0150 U	0.0150	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Toluene	0.0601 U	0.0601	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Ethylbenzene	0.0601 U	0.0601	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
P & M -Xylene	0.0601 U	0.0601	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
o-Xylene	0.0601 U	0.0601	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
<b>Surrogates</b>									
1,4-Difluorobenzene <surr>	82.7		%	AK101 8021B	A	72-105	09/22/04	09/30/04	MCM
4-Bromofluorobenzene <surr>	84.8		%	AK101 8021B	A	50-150	09/22/04	09/30/04	MCM
<b>Semivolatile Organic Fuels Department</b>									
Diesel Range Organics	29.6 U	29.6	mg/Kg	AK102	B		09/29/04	09/30/04	MCM
<b>Surrogates</b>									
5a Androstane <surr>	117		%	AK102	B	50-150	09/29/04	09/30/04	MCM
<b>Solids</b>									
Total Solids	89.3		%	SM20 2540G	B			09/28/04	AHP



SGS Ref.# 1046271004  
Client Name Hulbert, Ralph P.E.  
Project Name/# AK Gold Stockpile  
Client Sample ID AG92204-4  
Matrix Soil/Solid

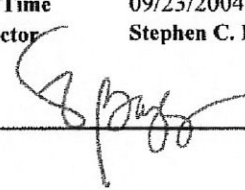
All Dates/Times are Alaska Standard Time  
Printed Date/Time 10/04/2004 9:30  
Collected Date/Time 09/22/2004 15:30  
Received Date/Time 09/23/2004 10:23  
Technical Director Stephen C. Ede  
Released By 

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<b>Volatile Fuels Department</b>									
Gasoline Range Organics	5.73	2.56	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Benzene	0.0128 U	0.0128	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Toluene	0.0511 U	0.0511	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Ethylbenzene	0.0511 U	0.0511	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
P & M -Xylene	0.0511 U	0.0511	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
o-Xylene	0.0511 U	0.0511	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
<b>Surrogates</b>									
1,4-Difluorobenzene <surr>	89.3		%	AK101 8021B	A	72-105	09/22/04	09/30/04	MCM
4-Bromofluorobenzene <surr>	115		%	AK101 8021B	A	50-150	09/22/04	09/30/04	MCM
<b>Semivolatile Organic Fuels Department</b>									
Diesel Range Organics	57.9 U	57.9	mg/Kg	AK102	B		09/29/04	09/30/04	MCM
<b>Surrogates</b>									
5a Androstane <surr>	130		%	AK102	B	50-150	09/29/04	09/30/04	MCM
<b>Solids</b>									
Total Solids	86.1		%	SM20 2540G	B			09/28/04	AHP



SGS Ref.# 1046271005  
Client Name Hulbert, Ralph P.E.  
Project Name/# AK Gold Stockpile  
Client Sample ID AG92204-5  
Matrix Soil/Solid

All Dates/Times are Alaska Standard Time  
Printed Date/Time 10/04/2004 9:30  
Collected Date/Time 09/22/2004 15:30  
Received Date/Time 09/23/2004 10:23  
Technical Director Stephen C. Ede  
Released By 

Sample Remarks:

DRO - The pattern is consistent with a weathered middle distillate.

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<b>Volatile Fuels Department</b>									
Gasoline Range Organics	2.77 U	2.77	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Benzene	0.0139 U	0.0139	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Toluene	0.0555 U	0.0555	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
Ethylbenzene	0.0555 U	0.0555	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
P & M -Xylene	0.0555 U	0.0555	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
o-Xylene	0.0555 U	0.0555	mg/Kg	AK101 8021B	A		09/22/04	09/30/04	MCM
<b>Surrogates</b>									
1,4-Difluorobenzene <surr>	82.2		%	AK101 8021B	A	72-105	09/22/04	09/30/04	MCM
4-Bromofluorobenzene <surr>	83.4		%	AK101 8021B	A	50-150	09/22/04	09/30/04	MCM
<b>Semivolatile Organic Fuels Department</b>									
Diesel Range Organics	68.3	29.9	mg/Kg	AK102	B		09/29/04	09/30/04	MCM
<b>Surrogates</b>									
5a Androstane <surr>	115		%	AK102	B	50-150	09/29/04	09/30/04	MCM
<b>Solids</b>									
Total Solids	88.7		%	SM20 2540G	B			09/28/04	AHP

ACE Job # AK Gold Contact \_\_\_\_\_ Sample Location Stockpile  
Purpose of Sampling \_\_\_\_\_ Matrix soil Layers \_\_\_\_\_ Method Grab  
Device \_\_\_\_\_ Preparation \_\_\_\_\_ Discrete ☒ or Composite \_\_\_\_\_ # of Subsamples \_\_\_\_\_  
Containers: Size 4oz Type \_\_\_\_\_ Number \_\_\_\_\_ Sample taken by P. Nutbrown  
Date 9-22-09 Time 1530 Witness \_\_\_\_\_ Date \_\_\_\_\_  
Laboratory to Perform Analysis SGS RUSH? \_\_\_\_\_ Date Results Requested: \_\_\_\_\_

1046271



Received at Laboratory By: \_\_\_\_\_ Date/Time \_\_\_\_\_ Condition of Containers: \_\_\_\_\_  
Temperature \_\_\_\_\_ Seals Intact \_\_\_\_\_ Laboratory ID # \_\_\_\_\_  
Comments: \_\_\_\_\_

***Please email results as soon as available to [hulbert@alaska.net](mailto:hulbert@alaska.net)***



SGS

## SAMPLE RECEIPT FORM

SGS WO#:

1046271



Yes No NA

- ☒ Are samples **RUSH**, priority, or w/n 72 hrs. of hold time?  
☒ If yes have you done e-mail notification?  
☒ Are samples **within 24 hrs.** of hold time or due date?  
☒ If yes, have you spoken with Supervisor?  
☒ Archiving bottles- if req., are they properly marked?  
☒ Are there any **problems**? PM Notified?  
☒ Were samples preserved correctly and pH verified?

\*Labels on pretreated jars

- ☒ If this is for PWS, provide **PWSID**.  
☒ Will courier charges apply?  
☒ Method of payment?  
☒ Data package required? (Level: 1 / 2 / 3 / 4)  
 Notes:  
☒ Is this a DoD project? (USACE, Navy, AFCEE)

Due Date: 9-30-04

Received Date: 9-23-04 / #4 9-24-04

Received Time: 1023

Is date/time conversion necessary?

# of hours to AK Local Time:

Thermometer ID: Ambient

Cooler ID	Temp Blank	Cooler Temp
	°C	°C
	°C	°C
	°C	°C
	°C	°C
	°C	°C

\*Temperature readings include thermometer correction factors

Delivery method (circle all that apply) Client

Alert Courier / UPS / FedEx / USPS /

AA Goldstreak / NAC / ERA / PenAir / Carlisle

Lynden / SGS / Other:

Airbill #

Additional Sample Remarks: (✓ if applicable)

Extra Sample Volume?

Limited Sample Volume?

Field preserved for volatiles?

Field-filtered for dissolved?

Lab-filtered for dissolved?

Ref Lab required?

Foreign Soil?

## This section must be filled out for DoD projects (USACE, Navy, AFCEE)

- | Yes | No |   | Samples/Analyses Affected: |
|-----|----|---|----------------------------|
|     |    | Is received temperature $4 \pm 2^\circ\text{C}$ ?             |                            |
|     |    | Exceptions:   |                            |
|     |    | Rad Screen performed?   |                            |
|     |    | Result:   |                            |
|     |    | Was there an airbill? (Note # above in the right hand column) |                            |
|     |    | Was cooler sealed with custody seals?                         |                            |
|     |    | # / where:  |                            |
|     |    | Were seal(s) intact upon arrival?                             |                            |
|     |    | Was there a COC with cooler?                                  |                            |
|     |    | Was the COC filled out properly?                              |                            |
|     |    | Did the COC indicate COE / AFCEE / Navy project?              |                            |
|     |    | Did the COC and samples correspond?                           |                            |
|     |    | Were all sample packed to prevent breakage?                   |                            |
|     |    | Packing material:   |                            |
|     |    | Were all samples unbroken and clearly labeled?                |                            |
|     |    | Were all samples sealed in separate plastic bags?             |                            |
|     |    | Were all VOCs free of headspace and/or MeOH preserved?        |                            |
|     |    | Were correct container / sample sizes submitted?              |                            |
|     |    | Is sample condition good?                                     |                            |
|     |    | Was copy of CoC, SRF, and custody seals given to PM to fax?   |                            |

## This section must be filled if problems are found.

Yes No  
Was client notified of problems?

Individual contacted:

Via: Phone / Fax / Email (circle one)

Date/Time:

Reason for contact:

Change Order Required?

SGS Contact:

Notes:

Received DA 9-24-04 1020

Completed by (sign):

(print):

Login proof (check one): waived ☒ required ☐ performed by:

10462/1



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Bottle Totals								10	
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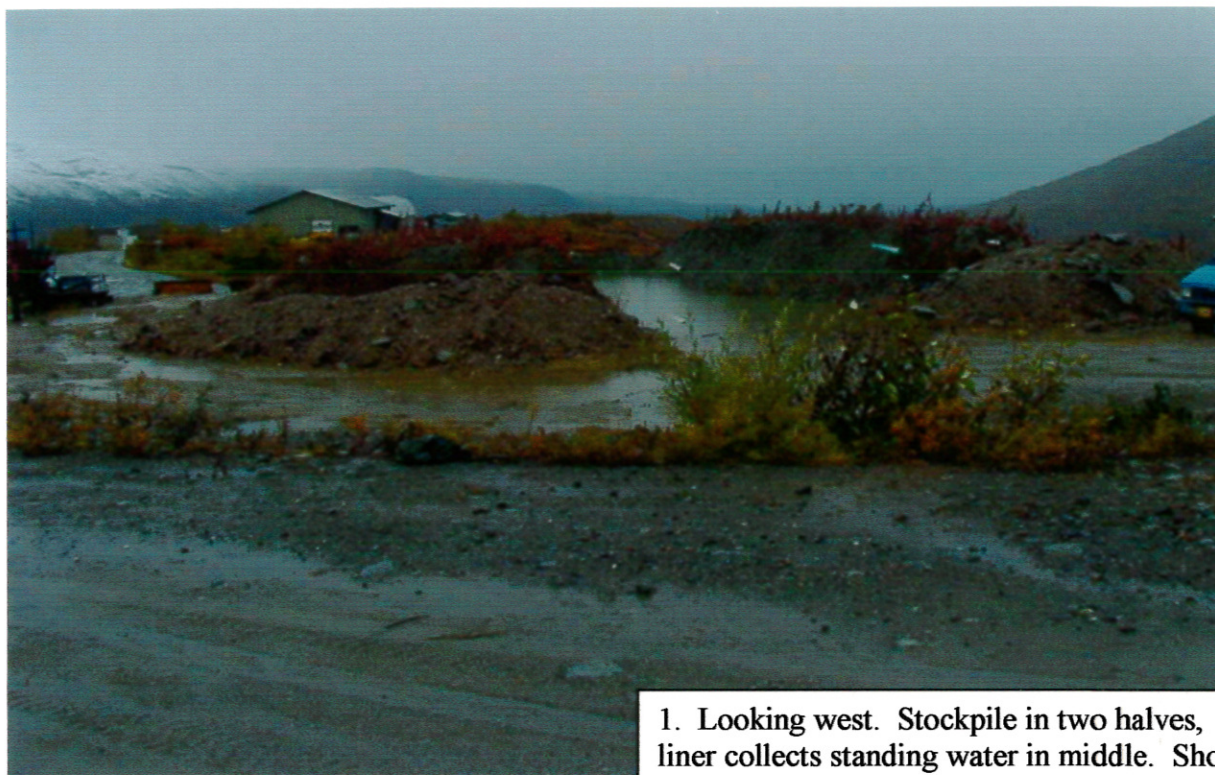
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Date: 9.23-04

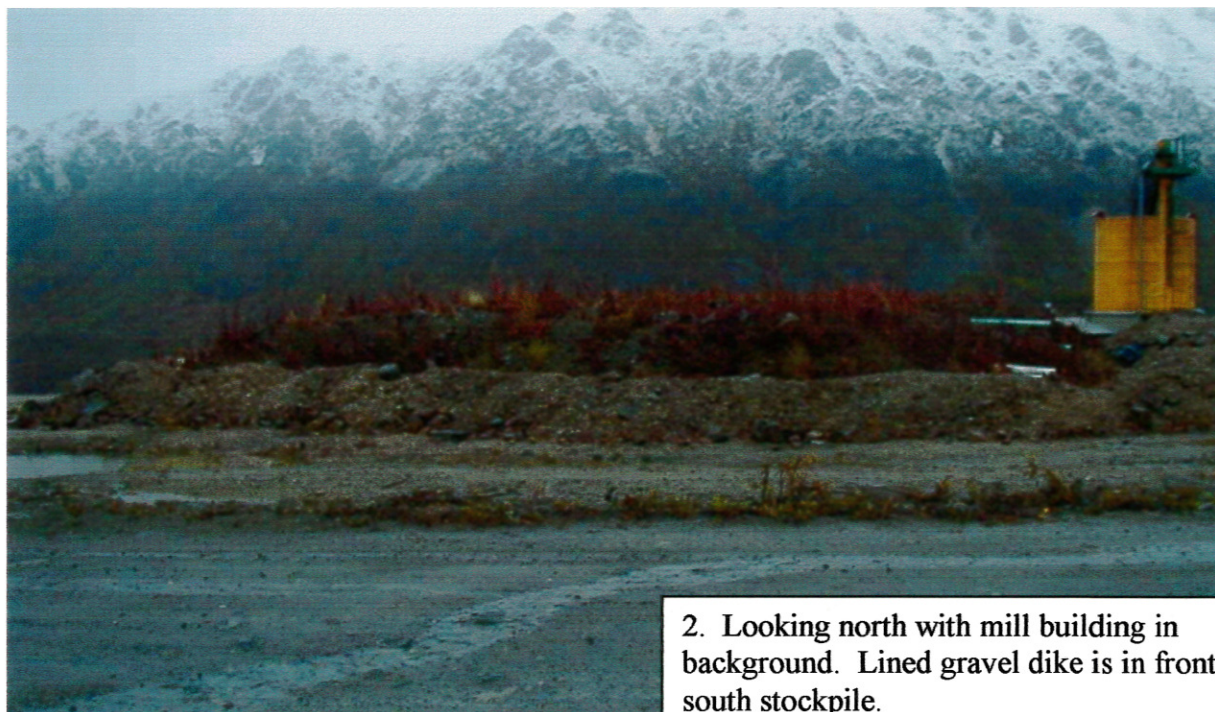


## Appendix 2 Photos

All photos taken 9/22/04



1. Looking west. Stockpile in two halves, liner collects standing water in middle. Shop is in background.



2. Looking north with mill building in background. Lined gravel dike is in front of south stockpile.



## Appendix 2 Photos

All photos taken 9/22/04



3. Looking east at north side of mill over partially filled excavations for tanks 1 and 2

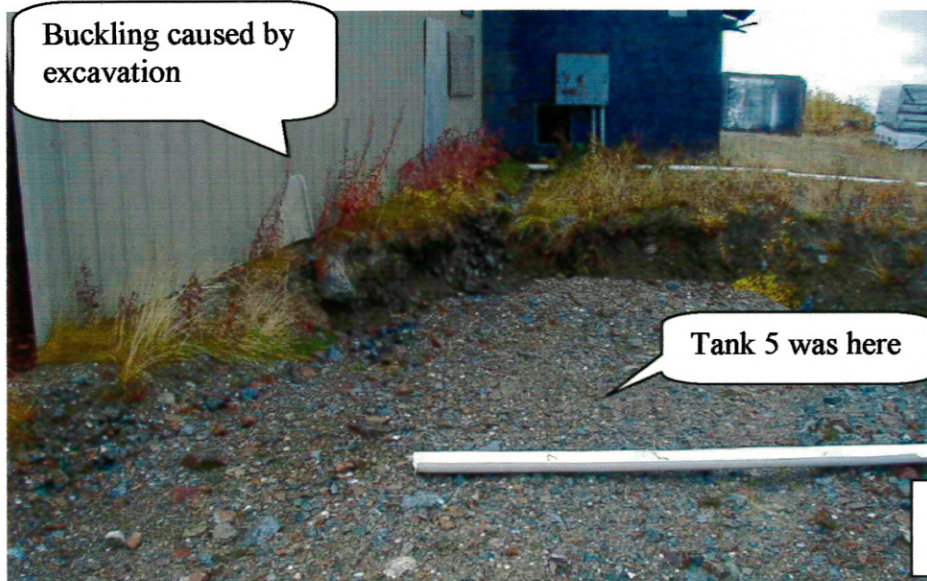


4. Looking west at shop

Bunkhouse

Hotspot remained under foundation in 2000

Tanks 3 & 4 were here



Buckling caused by excavation

Tank 5 was here

5. Looking west at NE corner of shop